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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Abhijeet Gole

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EXAMINER

VO. THANH DUC

ART UNIT

PAPER NUMBER

2189

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/07/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/692,495

Applicant(s)

GOLE ET AL.

Examiner

Thanh D. Vo

Art Unit

2189

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6-8,10,12,14,15,17 and 19-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6-8,10,12,14,15,17 and 19-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the Amendment filed on December 22, 2006. Claims 9 and 16 have been canceled. Claims 1, 3, 6, 10, 17, and 20 have been amended. Claims 1, 3, 4, 6-8, 10, 12, 14, 15, 17, 19-23 are presented for examination. Claims 1, 3, 4, 6-8, 10, 12, 14, 15, 17, 19-23 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 3 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As per claim 3, the condition of "when the first portion of the non-volatile storage device in the first storage server is full, sending a synchronization request to the second storage server from the first storage server" is nowhere to be found in the specification".

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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3. Claims 1, 3, 4, 6-8, 10, 12, 14, 15, 17, 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is claiming the following, "when the first portion of the non-volatile storage device in the first storage server is full, apply the data access request to a volume managed by the first storage server and causing the second storage server to apply the data access request to an image volume of the volume".

The limitation above is indefinite because the condition and the correlation amongst the limitations are not clearly presented and/or particularly pointed out the subject matter which applicant regards as the invention.

For example, the correlation of "when the first portion in the first storage server is full" does not correspondingly exist and/or making sense with the method of "apply the data access request to a volume managed by the first storage server". Furthermore, the limitations such as "first portion of the non-volatile storage device", "volume managed by the first storage server", and "image of the volume" are not distinctively claimed and are distinct from each other in such a way that one having an ordinary skill in the art to make sense of the subject matter being claimed.

Claim 17 is being rejected under the same rationale of claim 1 since it is sharing the same limitation cited above.

As per claim 10, the following limitation is indefinite:

"a mass storage device on the destination storage server to store the file, wherein the data access request is applied to a nonvolatile mass storage device

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coupled to the destination storage server when the first portion of the non-volatile storage device in the source storage server is full".

The limitation above is indefinite because the relationship presented above using the term "wherein" and "when" are not correlating with each other as a whole to particularly point out and making sense of the invention.

Claim 17 further contains following limitation that is indefinite:

"transferring the second data access request from the second memory to a **second file corresponding to the second source filer on the volume managed by the destination filer**".

The limitation above is indefinite because it does not particularly point out what is "second file corresponding to the second source filer **on the volume managed by the destination**".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 21 and 23 are rejected under 35 U.S.C. 102(b) as being unpatentable over Yanai et al. (6,502,205).

As per claim 21, Yanai et al. disclose a method of mirroring data, the method comprising, the method comprising:

operating a destination storage server to maintain a plurality of mirror volumes (Fig. 4, disk drive in secondary storage server) in a non-volatile mass storage subsystem (Fig. 1, disk array), wherein each mirror volume mirrors a corresponding one of a plurality of source volumes maintained by a plurality of source storage servers that are coupled to communicate with the destination storage server (col. 2, lines 60-65);

receiving, at the destination storage server, write requests from the source storage servers, each said write request corresponding to a write request received by one of the source storage servers from a storage client for updating one of the source volumes (col. 2, lines 60-67);

operating the destination storage server to store the write requests temporarily prior to synchronizing the mirror volumes with the source volumes, including storing a log of the write requests received by the destination storage server from the source storage servers in a non-volatile random access memory (col. 18, lines 5-9) in the destination storage server (col. 32, lines 49-58),

using the destination storage server to maintain a plurality of files in the non-volatile mass storage subsystem, each said file corresponding to a separate one of the plurality of source storage servers, and storing each write request received by the destination storage server from a source storage server in the one of said files which corresponds to said source storage server (col. 32, lines 59-67); and

in response to receiving a specified signal from the source storage server, operating the destination storage server to synchronize the mirror volumes with the source volumes based on the write requests received from the plurality of source

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storage servers (col. 32, lines 49-58, wherein a specified signal from the source storage server is inherent in Yanai et al. in order to perform the operation in the cited lines and column).

As per claim 23, Yanai et al. discloses a method, wherein each partition of the partitioned non-volatile random access memory in each of the source storage servers corresponds to a distinct one of the plurality of files in the non-volatile mass storage subsystem. See Fig. 12, items 293 and 294, wherein the log file is corresponding to the data file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3, 4, 6, 10, 12, 14-15, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanai et al. (US Patent 6,502,205) in view of Courts et al. (US Patent 5,636,360)

As per claims 1 and 10, Yanai et al. discloses a method for mirroring data comprising:

receiving at a first storage server (Fig. 1, item 14) a data access request from a client (Fig. 1, item 12) coupled to the first storage server 14 (See col. 2, line 60 - col. 3, line 9);

writing the data access request to a first portion of a non-volatile storage device (Fig. 1, item 28) in the first storage server (col. 7, line 66 – col. 8, line 1);

transmitting the data access request from the first storage server 14 to a second storage server (Fig. 1, item 46), wherein the second storage server writes the data to the data access request into a file stored in a mass storage device (Fig. 1, item 48) on the second storage server (See col. 10, lines 51-55);

when the first portion of the non-volatile storage device in the first storage server is full, applying the data access request to a volume managed by the first storage server and causing the second storage server to apply the data access request to an image volume of the volume. See col. 20, lines 5-20, wherein the data is transferred from the cache to the R1 volume of the first storage server then the data is also transferred to the R2 of the second storage server.

Yanai et al. does not particular teach when a cache is full then the data is transferred to the secondary storage devices.

Court et al. teaches a method of copying the contents of a log buffer to a log partition when the log buffer is full (col. 2, lines 35-37).

Therefore, it would have been obvious to one having an ordinary skill in the art at the time of the Applicant invention modify the cache of Yanai et al. to implement the method teaches by Court et al. to arrive at the current invention. The motivation of

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doing so is to avoid the data currently storing in the cache to be overwritten by the incoming data when the data currently storing in the cache are critical or valuable data as being taught by Yanai et al. at col. 1, lines 47-56.

As per claim 3, Yanai et al. sending a synchronization request at the second storage server from the first storage server when the first portion of the non-volatile storage device in the first server is full (see col. 10, lines 19-23); wherein as discussed in claim 1 above, the data is transferred from cache to R1 and R1 synchronize the updated data with R2.

As per claim 4, Yanai et al. discloses a method comprising:

sending an acknowledgement from the second storage server to the first storage server in response to receiving the data access request (col. 10, lines 19-24) to cause the first storage server to send a response to the client (col. 32, lines 26-27) after the data access request has been stored on the first storage server and stored in the mass storage device on the second storage server. See col. 32, lines 49-57 and col. 2, lines 60-67.

As per claim 6, file is associated with the first portion of the non-volatile storage device in the first storage server is inherent feature of Yanai et al. since the data that stored in the second storage server is previously transferred from the cache, therefore they are associated or related with each other.

As per claim 7, Yanai et al. discloses a method wherein the data access request is transmitted from the first storage server to the second storage server over a network. (Fig. 12, items 240-241 and col. 12, lines 40-42)

As per claim 8, Yanai et al. discloses a method comprising:
assigning a sequence number to the data access request, wherein the sequence number designates a position of the data access request in a group of data access requests to ensure that the data access request is properly ordered within the data container. See col. 18 lines 45-54.

As per claim 12, Yanai et al. discloses an apparatus wherein the network comprises a Transmission Control Protocol/Internet Protocol (TCP/IP) network. See col. 13, lines 7-13, wherein the TCP/IP is an inherent feature of the ESCON system.

As per claim 14, Yanai et al. discloses an apparatus wherein the memory comprises a nonvolatile random access memory (NVRAM). See col. 18, lines 5-9, *wherein random access memory is backed-up by a battery power which makes the RAM becomes a nonvolatile random access memory.*

As per claim 15, Yanai et al. discloses an apparatus wherein the destination storage server modifies an image of a volume maintained by the source storage server on a second nonvolatile mass storage device (secondary volumes) coupled to the

destination storage server according to the access request (col. 10, lines 50-58) when the source storage server makes a synchronization request (col. 10, lines 19-23).

As per claim 22, Yanai et al. discloses method, wherein each of the source storage servers maintains a separate log of write requests from storage clients in a partitioned non-volatile random access memory (Fig. 12, item 291).

Yanai et al. does not particular disclose that the specified signal is corresponding to a partition become full in one of the non-volatile random access memory.

Court et al. discloses method of copying the contents of a log buffer to a log partition when the log buffer is full (col. 2, lines 35-37).

It would have been obvious to one having an ordinary skill in the art at the time of the invention to readily recognize that the specified signal can be a signal indicating that a particular storage area is full as disclosed by Court et al. Therefore, it would have been obvious to one having at the time of the invention to modify the signal of Yanai et al. to be a signal indicating that a non-volatile random access memory is full in order to arrive at the current invention. The motivation of doing so is to enable the source storage server to know that there is data need to be written from the memory to the storage device before the data could be lost or causing the system to be delayed.

6. Claims 17, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanai et al. (6,502,205) in view of McMillian, Jr., Achiwa et a. (US 20040153719) and Courts et al. (US Patent 5,636,360).

As per claim 17, Yanai et al. discloses a method comprising:

receiving a data access request at a destination filer from a first source filer (col. 9, lines 59-64, wherein the data is copied to the second storage system from the primary storage system and the data is externally influenced by a host coupled to the primary storage system), wherein the data access request is written to a first portion (Fig. 18, item 502) of a first memory (Fig. 1, item 228) coupled to the source filer (col. 7, line 66 – col. 8, line 1);

sending an acknowledgement to the first source filer in response to the destination filer receiving the data access request (col. 10, lines 19-24);

writing the data access request to a second memory (Fig. 1, item 64) in the destination filer (col. 20, lines 10-13);

transferring the data access request from the second memory to a file corresponding to a source filer on a volume managed by the destination filer (col. 20, lines 5-13);

receiving a second data access request from a second source filer (col. 2, lines 54-59), wherein the second data access request is written to a third memory coupled to the second source filer (col. 32, lines 55-56);

sending a second acknowledgement to the second source filer in response to the destination filer receiving the second data access request (col. 10, lines 19-24);

writing the second data access request to the second memory (Fig. 12, item 293, col. 32, lines 49-57);

transferring the second data access request from the second memory to a second file corresponding to the second source filer on the volume coupled to the destination filer (col. 32, lines 37-38; lines 49-53);

when the first portion of the non-volatile storage device in the first storage server is full, applying the data access request to a volume managed by the first storage server and causing the second storage server to apply the data access request to an image volume of the volume. See col. 20, lines 5-20, wherein the data is transferred from the cache to the R1 volume of the first storage server then the data is also transferred to the R2 of the second storage server.

Yanai et al. does not particular teach when a cache is full then the data is transferred to the secondary storage devices.

Court et al. teaches a method of copying the contents of a log buffer to a log partition when the log buffer is full (col. 2, lines 35-37).

Therefore, it would have been obvious to one having an ordinary skill in the art at the time of the Applicant invention modify the cache of Yanai et al. to implement the method teaches by Court et al. to arrive at the current invention. The motivation of doing so is to avoid the data currently storing in the cache to be overwritten by the incoming data when the data currently storing in the cache are critical or valuable data as being taught by Yanai et al. at col. 1, lines 47-56.

Yanai et al. did not explicitly disclose a method of removing the data access request from the second memory after transferring the data access request to the volume. However, McMillan disclosed a method of removing a request when an

acknowledgement is transferred from one location to another (col. 5, lines 35-39). At the time of the Applicant's invention it would have been obvious to one having an ordinary skill in the art to recognize that it is advantageous to remove/delete the access request once the transaction is completed or the data has been transferred. The motivation of doing so is to prevent unnecessary data from transferring to the volume again and maintaining an appropriate operation of the system while increasing data throughput.

Yanai et al. does not disclose a second source filer coupled to the destination filer which performing the duplicate tasks as of the first source filer. However, Achiwa et al. discloses a system wherein there are multiple storage servers interconnected with each other in order to replicate the copy of data stored in the storage device. See Fig. 1 and page 1, paragraph 0009, lines 1-12.

As per claim 19, Yanai et al. did not explicitly disclose a method of connecting a second source filer to the client in response to a system failure.

However, Achiwa et al. discloses a method further comprising connecting the second source filer to the client in response to a system failure. See page 1, paragraph 0006, lines 4-7.

It would have been obvious to one having an ordinary skill in the art at the time of the Applicant's invention to connect the source filer to the client in response to the system failure. The motivation of doing so is to provide a stable storage system since

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there are additional sources to take over the operation process if one of the other sources failed.

As per claim 20, Yanai et al. discloses allowing the client to access the image.
See col. 17, lines 25-40.

Response to Arguments

7. Applicant's arguments filed on December 22, 2006 have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 17, 19, and 20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh D. Vo whose telephone number is (571) 272-0708. The examiner can normally be reached on M-F 9AM-5:30PM.

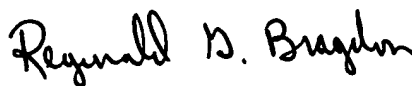
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reginald G. Bragdon can be reached on (571) 272-4204. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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2/28/2007



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